

**IN THE UNITED STATES  
PATENT AND TRADEMARK OFFICE**

5 **PATENT APPLICATION**

Applicant(s): Kedar Sharadchandra Namjoshi  
Case: 2  
Serial No.: 10/614,618  
10 Filing Date: July 7, 2003  
Group: 2193  
Examiner: Tuan A. Vu

15 Title: Method and Apparatus for Reducing a Program Size While Maintaining  
Branching Time Properties and Automated Checking of Such Reduced Programs

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20 APPEAL BRIEF

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

25 Sir:

Applicant hereby appeals the final rejection dated May 14, 2007, of claims 1  
through 26 of the above-identified patent application.

30 REAL PARTY IN INTEREST

The present application is assigned to Lucent Technologies Inc., as evidenced by  
an assignment recorded on July 7, 2003 in the United States Patent and Trademark Office at Reel  
014318, Frame 0212. The assignee, Lucent Technologies Inc., is the real party in interest.

35 RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

### STATUS OF CLAIMS

Claims 1 through 26 are presently pending in the above-identified patent application. The specification is rejected under 35 U.S.C. 112, first paragraph, which requires the specification to be written in "full, clear, concise, and exact terms." The Examiner noted that the incorporation of 'essential' material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. The disclosure was objected to under 37 CFR 1.71, as being so incomprehensible as to almost preclude a reasonable search of the prior art by the Examiner. Claims 1-26 are rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter, claims 1-26 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement, and claims 1-26 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-11 and 14-24 are rejected under 35 U.S.C. §102(b) as being anticipated by Alur et al. (United States Patent Number 6,324,496), and claims 12, 13, 25, and 26 are rejected under 35 U.S.C. §103(a) as being unpatentable over Alur et al., and further in view of Alur et al., "Alternating-time Temporal Logic," Foundations of Computer Science, FOCS 1997, Proceedings of the 38<sup>th</sup> Annual Symposium, pp. 100-107, hereinafter "Alur2 "

### STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the final rejection.

### SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to a method (FIG. 1: 200) for reducing a program, M, that preserves at least one branching time property, f (page 3, lines 20-29), comprising the steps of: forming a product of said program, M and said branching time property, f, expressed as an automaton, A (page 6, lines 18-22); obtaining an abstract domain containing a set of abstract values to generalize possible states of said program and abstract relations that relate said program

states to said abstract domain (page 6, line 18, to page 7, line 3); and computing an abstract program with a reduced number of states and an altered version of said branching time property, f, using said product (page 3, lines 20-29).

Independent claim 14 is directed to a system for reducing a program, M, that  
5 preserves at least one branching time property, f (page 3, lines 20-29), comprising: a memory; and a processor operatively coupled to said memory, said processor configured to: form a product of said program, M and said branching time property, f, expressed as an automaton, A (page 6, lines 18-22); obtain an abstract domain containing a set of abstract values to generalize possible states of said program and abstract relations that relate said program states to said  
10 abstract domain (page 6, line 18, to page 7, line 3); and compute an abstract program with a reduced number of states and an altered version of said branching time property, f, using said product (page 3, lines 20-29).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

15 The specification is rejected under 35 U.S.C. 112, first paragraph, which requires the specification to be written in "full, clear, concise, and exact terms." The Examiner noted that the incorporation of 'essential' material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. The disclosure was objected to under 37 CFR 1.71, as being so incomprehensible as to almost preclude a reasonable  
20 search of the prior art by the Examiner. Claims 1-26 are rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter, claims 1-26 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement, and claims 1-26 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the  
25 invention. Claims 1-11 and 14-24 are rejected under 35 U.S.C. §102(b) as being anticipated by Alur et al, and claims 12, 13, 25, and 26 are rejected under 35 U.S.C. §103(a) as being unpatentable over Alur et al, and further in view of Alur2.

## ARGUMENT

### Section 112 Rejections

The specification was rejected under 35 U.S.C. 112, first paragraph, which requires the specification to be written in “full, clear, concise, and exact terms,” and noted that  
5 the incorporation of ‘essential’ material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. The disclosure was objected to under 37 CFR 1.71, as being so incomprehensible as to almost preclude a reasonable search of the prior art by the Examiner. Claims 1-26 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement, and under 35 U.S.C. §112,  
10 second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Appellant has made every attempt to address all of the Examiner’s concerns cited in the above rejections.

The specification was rejected under 35 U.S.C. 112, first paragraph, which  
15 requires the specification to be written in “full, clear, concise, and exact terms.” In particular, the Examiner cited some examples of terms recited in the specification that are alleged to be unclear, inexact, or verbose (page 2 of the present Office Action). The Examiner further asserts that “the description to explain on the meaning of these symbolic elements in terms of more decipherable and common phraseology is observed as being far inadequate for one skill in the art  
20 to comprehend the semantic or legend underlying or pertaining to those expressions.” The Examiner asserts that the disclosure is marred with two main deficiencies: (i) the lack of consistency in accompanying each element of the equations with a decent legend or explanation therefore to put forth a rationale, and (ii) the disjoint relationship or non-connectivity between the equations mentioned.

25 Appellant notes that all new concepts disclosed in the specification have been defined in the specification. The remaining terms and concepts, e.g.,  $AX(p) \vee AX(\neg p)$ , are standard concepts in the art. The notation at the bottom of page 2 is standard notation in logic, as

would be apparent to a person of ordinary skill in the art. More importantly, Appellant notes that the present disclosure is based on a paper, entitled "Abstraction for Branching Time Properties," which was reviewed by those skilled in the art and accepted at the premiere conference in the field (Computer Aided Verification (CAV 2003)).

5               Regarding the Examiner's assertion that the incorporation of 'essential' material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper, Appellant notes that only non-essential material provided for background information has been incorporated by reference.

10               The Examiner further asserts that "the complex nature of the invention subject matter is not clearly, and properly put forth in the Specifications to enable one skill in the art to have sufficient basic grasp on any novel aspect being claimed," and that "there is not sufficient consistency or unity in conveying of a rationale to support a common endeavor." The Examiner asserts that the specification lacks in explaining the nature of often very uncommon logical/mathematical operators, e.g. "M X A."

15               As noted above, the present disclosure is based on a paper, entitled "Abstraction for Branching Time Properties," which was reviewed by those skilled in the art and accepted at the premiere conference in the field. Appellant also notes that the notation M X A (cross product of a program with automaton) is a standard operation, as would be well understood by a person of ordinary skill in the art.

20               Claims 1-26 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. In particular, the Examiner provided the following comments:

                  The Specification does not provide (a) teaching about a product of program M expressed as an automation f.

25               The Specifications fail to disclose any embodiment that actually generates such abstract set of reduced states in terms of an application or engineering-level programmatic product.

30               The disclosed invention does not sufficiently teach a product being formed from a program M and a time property f in order to convey that the time property f is being expressed by an automaton f (as recited).

The inventor does not appear to possess the cited limitation at the time the invention was made, namely teachings or explicit and substantial specifics about how an automaton is expressing one time property.

5 Claims 2-13 fail to provide (a) teaching as to how the recited abstract transitions and states can be enabled by means of application level implementation(s) to realize a useful set of result deemed statutory as per the USC §101 requirement.

10 Claim 14 does not convey that the recited abstract program can be obtained via any real-world application or implementing utility deemed substantial, tangible and specific as perceived from the Specifications in order for one person by reading the specification to make use of the content therein to realize some useful application result as set forth above.

15 Further against claim 14, the invention does not teach a product being formed from a time property  $f$  being expressed as an automaton. The inventor does not appear to possess this  $f$  property expressed as automaton  $f$  at the time the invention was made.

20 Regarding the Examiner's assertion that the Specifications does not provide a teaching about a product of program  $M$  expressed as an automation  $f$ , and that the Specifications fail to disclose any embodiment that actually generates such abstract set of reduced states in terms of an application or engineering-level programmatic product, Appellant notes that such teachings and embodiments are disclosed on page 6, line 13, to page 8, line 3, of the present disclosure.

25 Regarding the Examiner's assertion that the inventor does not appear to possess the cited limitation at the time the invention was made, namely teachings or explicit and substantial specifics about how an automaton is expressing one time property, Appellant notes that this subject is addressed at page 6, line 13, to page 10, line 20, of the present disclosure.

30 The Examiner also asserts that claims 2-13 fail to provide (a) teaching as to how the recited abstract transitions and states can be enabled by means of application level implementation(s) to realize a useful set of result deemed statutory as per the USC §101 requirement, and that claim 14 does not convey that the recited abstract program can be obtained via any real-world application or implementing utility deemed substantial, tangible and specific as perceived from the Specifications in order for one person by reading the specification to make

use of the content therein to realize some useful application result as set forth above. Appellant notes that, in light of the present specification and well known techniques in the art, a person of ordinary skill in the art would be able to implement an application level system to perform the transitions and states recited in claims 2-13.

5           Claims 1-26 were also rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner provided the following comments:

10           Claim 1 recites 'forming a product of... M and said branching... property f, expressed as an automaton f'. There is inconsistency in more than one object being represented by a same 'f' and the Specifications does not seem to be consistent with this nomenclature.

15           Claim 5 recites S', S(bar) and 'X' and only S and Q are explained leaving out S(bar) and 'X'.

          Claim 6 does not provide (an) explanation of the symbols  $\langle a \rangle q_1$  and of  $\delta(q, true)$  and of the 'V' symbol.

          Claims 7-9 recite symbols for which only a few are provided with some definition

20           Claims 10-11 recite an acronym for which there is no definition.

          Regarding the Examiner's assertion that claim 1 recites 'forming a product of... M and said branching ... property f, expressed as an automaton f', that there is inconsistency in more than one object being represented by a same 'f', and that the Specifications does not seem  
25   to be consistent with this nomenclature, Appellant notes that claim 1 has been amended to correct the typographical error.

          Regarding the Examiner's assertion that claim 5 recites S', S(bar) and 'X' and only S and Q are explained leaving out S(bar) and 'X', Appellant notes that the terms S(bar) and 'X' are terms well understood by persons of ordinary skill in the art.

30           Regarding the Examiner's assertion that claims 7-9 recite symbols for which only a few are provided with some definition and that claim 6 does not provide explanation of the

symbols  $\langle a \rangle q_1$  and of  $\delta(q, true)$  and of the 'V' symbol, Appellant notes that the cited symbols are well understood by persons of ordinary skill in the art of logic.

Regarding the Examiner's assertion that claims 10-11 recite an acronym for which there is no definition, Appellant notes that the term "AIS" is a term well understood by persons of ordinary skill in the art.

#### Section 101 Rejections

Claims 1-26 were rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. In particular, the Examiner asserts that the end result (regarding claim 1) appears to be an abstract program having reduced states obtained from other abstract entities, and that an abstract program represented by computing state values cannot be perceived as tangible real-world data, absent any description or elaboration as to the manner in which these reduced states are contained, embodied as or persisted into. The Examiner further asserts that claim 1 amounts to generating abstract and unstable entities (states of a computing process being volatile) and is rejected for not sufficiently conveying that the result produced belong(s) to application level data in terms of a concrete, tangible, and useful result, as required by the Practical Application Test requirement. The Examiner rejected claims 1-13 for not reciting sufficient teaching to convey a Practical Application leading to a tangible result, and claims 14-26 for not providing further teaching as to creating a tangible useful set of outputs.

The Supreme Court has stated that the "[t]ransformation and reduction of an article 'to a different state or thing' is the clue to patentability of a process claim." *Gottshalk v Benson*, 409 U.S. 63, 70, 175 U.S.P.Q. (BNA) 676 (1972). In other words, claims that require some kind of transformation of subject matter, which has been held to include intangible subject matter, such as data or signals, that are representative of or constitute physical activity or objects have been held to comply with Section 101. See, for example, *In re Warmerdam*, 31 U.S.P.Q.2d (BNA) 1754, 1759 n.5 (Fed. Cir. 1994) or *In re Schrader*, 22 F.3d 290, 295, 30 U.S.P.Q.2d (BNA) 1455, 1459 n.12 (Fed. Cir. 1994).



Thus, as expressly set forth in each of the independent claims, the claimed methods or system provide program reduction and transform a program into a reduced abstract program. This transformation to a reduced abstract program provides a useful, concrete and tangible result for testing and verifying the original program, as described in the Background section of the present disclosure.

Appellant submits that each of the claims 1-26 are in full compliance with 35 U.S.C. §101, and accordingly, respectfully requests that the rejection under 35 U.S.C. §101 be withdrawn

#### Independent Claims 1 and 14

Independent claims 1 and 14 were rejected under 35 U.S.C. §102(b) as being anticipated by Alur et al. Regarding claim 1, the Examiner asserts that Alur teaches computing an abstract program with a reduced number of states and an altered version of said branching time property, f, using said product (e.g. reduction -- col. 9, lines 36-52; col. 10, lines 23-51; FIGS. 9 and 11; col. 11, line 47, to col. 12, line 22).

Appellant notes that Alur is directed to an analysis of a hierarchical machine. Alur does **not**, however, address the issue of ***reducing a program while preserving branching time properties***. Appellant also notes that the use of a product construction with an automaton does **not** imply that program reduction is being performed. Independent claims 1 and 14 require computing an abstract program with a *reduced number of states* and an altered version of said branching time property, f, using said product.

Thus, Alur does not disclose or suggest computing an abstract program with a reduced number of states and an altered version of said branching time property, f, using said product, as required by independent claims 1 and 14.

#### Additional Cited References

Alur2 was also cited by the Examiner for its disclosure of resolving branching temporal logics with quantification of paths.

Appellant notes that Alur2 teaches how to perform an evaluation of branching time properties on an original program. Alur2 does *not*, however, address the issue of reducing a program while preserving branching time properties.

Thus, Alur2 does not disclose or suggest computing an abstract program with a reduced number of states and an altered version of said branching time property, *f*, using said product, as required by independent claims 1 and 14.

Response to Arguments

Point A

10 The Examiner asserts that the inclusion of a publication (incorporation of patent or publication) in the Disclosure has to be expressly done so using appropriate “incorporated by reference” according to CFR 1.57 (the material being incorporated has to be essential to the explaining the technological aspects of the disclosure, and has to be from the same inventive entity or ownership).

15 Appellant notes that it is *not* required to “incorporate by reference” the cited publication since the publication was cited to simply demonstrate that the terms and concepts not defined in the specification are well known terms and concepts in the art.

Point B

20 The Examiner asserts that the documents “incorporated by reference” are essential for one of ordinary skill in the art to grapple the meaning of the subject being described at pages 4-5, rendering the incorporation by reference of publication (of essential material) improper.

Appellant maintains that a person of ordinary skill in the art would consider the documents “incorporated by reference” as background material and that the material disclosed in the documents is not essential to understanding and implementing the disclosed invention

25 Point C

The Examiner asserts that Appellant’s mere enumerating of some pages would not be sufficient to clarify the points raised by the 112 rejections.

Appellant notes that the Examiner originally asserted that the Specifications does not provide a teaching about a product of program M expressed as an automation f, and that the Specifications fail to disclose any embodiment that actually generates such abstract set of reduced states in terms of an application or engineering-level programmatic product. The teachings and embodiments disclosed on page 6, line 13, to page 8, line 3, of the present disclosure clearly address the issues raised by the Examiner and, in light of these teachings, demonstrate that the Applicant had “possession of the claimed invention” and that the application as filed fulfills the disclosure requirements.

Point D

10 The Examiner asserts that the mere fact of relying on well-known concepts that must be pre-owned by one of ordinary skill in the art (of logic) to remedy to the lack of definite teaching in the claimed invention is therefore largely unjustified.

Appellant maintains that the specification provides a “definite teaching” to a person of ordinary skill in the art of logic and that it is not necessary to define in the specification concepts that are well known to those of ordinary skill in the art of logic

Point E

The Examiner notes that the section 101 rejection has identified not only a lack of result being tangible in the realm of application utility, but also a lack of support (section 112, first paragraph) in the specification.

20 As argued above, Appellant maintains that the section 112 rejections are improper and respectfully requests that the cited rejections be withdrawn.

Point F

The Examiner asserts that Applicant’s arguments regarding the section 102 rejection in view of Alur fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

As argued above, Appellant notes that Alur does **not** address the issue of **reducing a program while preserving branching time properties**. Appellant also notes that the use of a product construction with an automaton does *not* imply that program reduction is being performed and that the independent claims require computing an abstract program with a  
5 *reduced number of states* and an altered version of said branching time property, *f*, using said product. Contrary to the Examiner's assertion, Appellant has specifically pointed out limitations required by the independent claims of the present application that are **not** disclosed or suggested by the cited prior art.

Point G

10 The Examiner asserts that the fact that the preamble of these claims mentions 'preserving branching properties' is not necessarily putting a weight into the body of the claim unless sufficient teaching therein provides clear insight as to how this branching property is preserved and that this preserving limitation appears to be missing in terms of specific actions and virtually not referred to as far as the claims evolve.

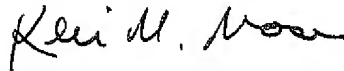
15 Appellant notes that the specification provides a detailed description as to how the branching property is preserved. (See, for example, page 3, line 20, to page 10, line 11, of the originally filed disclosure.) Appellant also notes that the argument cited by the Examiner states that "Alur does **not**, however, address the issue of **reducing a program while preserving branching time properties**." This statement points out that Alur is *not* even directed to the issue  
20 of reducing a program while preserving branching time properties. The argument also noted that the use of a product construction with an automaton does *not* imply that program reduction is being performed and that the independent claims require computing an abstract program with a *reduced number of states* and an altered version of said branching time property, *f*, using said product. Thus, the argument presented limitations required by the present independent claims  
25 that are not disclosed or suggested by the cited prior art.

Conclusion

The rejections of the cited claims under sections 102 and 103 in view of Alur et al. and Alur2, alone or in any combination, are therefore believed to be improper and should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,



Date: August 14, 2007

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APPENDIX

1. A method for reducing a program, M, that preserves at least one branching time property, f, comprising the steps of:

5 forming a product of said program, M and said branching time property, f, expressed as an automaton, A;

obtaining an abstract domain containing a set of abstract values to generalize possible states of said program and abstract relations that relate said program states to said abstract domain; and

10 computing an abstract program with a reduced number of states and an altered version of said branching time property, f, using said product.

2. The method of claim 1, further comprising the step of performing an automated program check.

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3. The method of claim 2, wherein said automated program check is a model checking step.

4. The method of claim 3, wherein said automated program check is performed for an altered branching time property.

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5. The method of claim 1, wherein said computing step further comprises the step of defining a set of states,  $S'$ , in said abstract program as  $S' = \bar{S} \times Q$ , where  $S$  is a set of states in said program, M, and Q is a set of states of the automaton, A.

25

6 The method of claim 5, wherein OR states in said set of states,  $S'$ , are those states where  $\delta(q, true)$  has the form  $q_1 \vee q_2$  or  $\langle a \rangle q_1$ , and all other states are AND states, where q are

individual states and  $\delta$  is a transition relation between states.

7. The method of claim 5, wherein an abstract state  $(t, \hat{q})$  is in a subset of initial states,  $I'$ , of the abstract program if there exists  $s \in I$  for which  $s \overset{E}{\xi}_{\hat{q}} t$ , where  $s$  is an individual state,  $I$  is a subset of initial states,  $I$ , of the program,  $M$ , and  $\overset{E}{\xi}_{\hat{q}}$  is one of said abstract relations

8. The method of claim 5, wherein for an abstract AND state  $(t, q)$ , the transition  $((t, q); (t', q'))$  is in an abstract transition relation,  $R'$ , if there exists a concrete state  $(s, q)$  and a successor  $(s', q')$  that are related to  $(t, q); (t', q')$  respectively.

9. The method of claim 5, wherein for an abstract OR state  $(t, q)$ , the transition  $((t, q); (t', q'))$  is in an abstract transition relation,  $R'$ , only if for every  $(s, q)$  which is related to  $(t, q)$ , there exists a successor  $(s', q')$  which is related to  $(t', q')$ .

10. The method of claim 8, wherein said product AIS  $M \times A$  is abstracted by weakening said transition relations at AND states.

11. The method of claim 9, wherein said product AIS  $M \times A$  is abstracted by strengthening said transition relations at OR states

12. The method of claim 8, further comprising the step of obtaining one or more rank functions and employing said one or more rank functions in an abstract transition relation,  $R'$ .

13. The method of claim 8, further comprising the step of obtaining one or more choice predicates and employing said one or more rank functions in an abstract transition

relation,  $R'$ .

14. A system for reducing a program, M, that preserves at least one branching time property, f, comprising:

- 5 a memory; and  
a processor operatively coupled to said memory, said processor configured to:  
form a product of said program, M and said branching time property, f, expressed  
as an automaton, A;  
obtain an abstract domain containing a set of abstract values to generalize possible  
10 states of said program and abstract relations that relate said program states to said abstract  
domain; and  
compute an abstract program with a reduced number of states and an altered  
version of said branching time property, f, using said product.

15 15. The system of claim 14, wherein said processor is further configured to perform  
an automated program check.

16. The system of claim 15, wherein said automated program check is a model  
checking step.

20

17. The system of claim 16, wherein said automated program check is performed for  
an altered branching time property.

18. The system of claim 14, wherein said processor is further configured to define a  
25 set of states,  $S'$ , in said abstract program as  $S' = \bar{S} \times Q$ , where  $S$  is a set of states in said  
program, M, and Q is a set of states of the automaton, A.



19. The system of claim 18, wherein OR states in said set of states,  $S'$ , are those states where  $\delta(q, true)$  has the form  $q_1 \vee q_2$  or  $\langle a \rangle q_1$ , and all other states are AND states, where  $q$  are individual states and  $\delta$  is a transition relation between states.

5 20. The system of claim 18, wherein an abstract state  $(t, \hat{q})$  is in a subset of initial states,  $I'$ , of the abstract program if there exists  $s \in I$  for which  $s \xi_{\hat{q}} t$ , where  $s$  is an individual state,  $I$  is a subset of initial states,  $I$ , of the program,  $M$ , and  $\xi_{\hat{q}}$  is one of said abstract relations

21. The system of claim 18, wherein for an abstract AND state  $(t, q)$ , the transition  $((t, q); (t', q'))$  is in an abstract transition relation,  $R'$ , if there exists a concrete state  $(s, q)$  and a successor  $(s', q')$  that are related to  $(t, q); (t', q')$  respectively.

10

22. The system of claim 18, wherein for an abstract OR state  $(t, q)$ , the transition  $((t, q); (t', q'))$  is in an abstract transition relation,  $R'$ , only if for every  $(s, q)$  which is related to  $(t, q)$ , there exists a successor  $(s', q')$  which is related to  $(t', q')$ .

15

23. The system of claim 21, wherein said product ATS  $M \times A$  is abstracted by weakening said transition relations at AND states.

24. The system of claim 22, wherein said product ATS  $M \times A$  is abstracted by strengthening said transition relations at OR states.

20

25. The system of claim 21, further comprising the step of obtaining one or more rank functions and employing said one or more rank functions in an abstract transition relation,  $R'$ .

26. The system of claim 21, further comprising the step of obtaining one or more choice predicates and employing said one or more rank functions in an abstract transition relation,  $R'$ .

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.